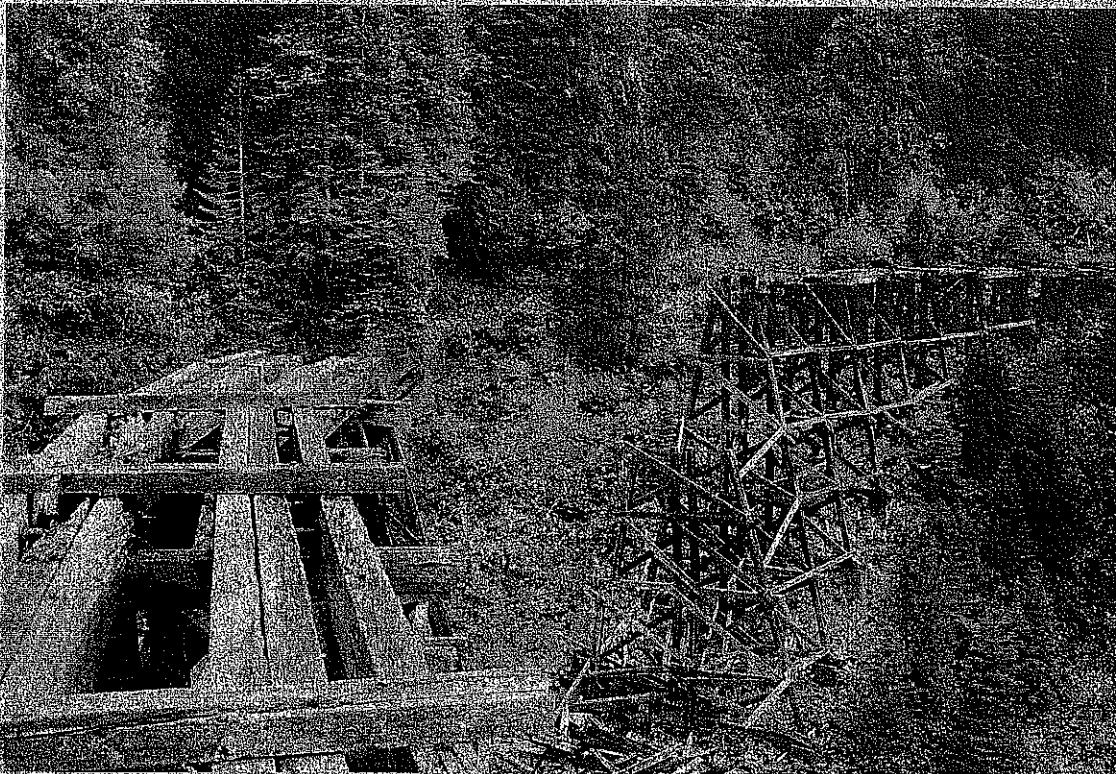


# BOURLAND TRESTLE HISTORIC PRESERVATION OPTIONS



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HISTORIC PRESERVATION OPTIONS  
FOR THE

BOURLAND TRESTLE  
IN THE  
STANISLAUS NATIONAL  
FOREST

PRODUCED FOR:

STANISLAUS NATIONAL FOREST  
19777 GREENLEY ROAD  
SONORA, CA 95370  
CONTRACT NO. 43-9A40-9-2043

PREPARED BY:

McCABE · PRESSEY · ARCHITECTS  
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(916) 447-4347

January 5, 2000

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## BOURLAND TRESTLE

### INTRODUCTION

The Bourland Trestle was built in 1922, as designed by West Side employee Fred Ellis. It spans 315' and stands approximately 76' above Bourland Creek. It consists of a concrete anchor on each end and 22 Fir Timber Bents between them. A severe flood in 1995 and an earthquake in 1999 caused Bents #7-14 to collapse.

We spent many hours examining the Trestle Bents that are still standing, the debris in the creek, the existing documents, and the accessibility of the trail into the trestle. Our examination of the remaining Bents was to determine how much, if any, of the remaining material would need to be repaired or replaced. The debris pile was looked at to determine how much of the existing material would be reusable and what would have to be hauled away. We estimate that 25% of the wood in the stream bed is reusable and that 80% of the cast iron hardware is retrievable and reusable. The path into the project was looked at to determine accessibility for equipment and labor to accommodate the projects needs.

The most difficult aspect in terms of cost to the project is the accessibility issue. The inability to get larger equipment such as, cement mixers, lumber supply trucks, etc., into the site will limit types of equipment that can be brought in to facilitate the work. Smaller trucks with smaller loads will mean more trips in and out of the site. Hauling away debris will also be difficult and will increase the cost of the project.

This report has included the four following options to develop the Historic Bourland Trestle: Option 1) complete removal of Bourland Trestle and interpreting it on its former site; Option 2) stabilizing the existing, standing portions of the trestle, removing the fallen elements, and maintaining the trestle in a state of arrested decay; Option 3) constructing a new pedestrian bridge over Bourland Creek that connects with the West Side's former mainline grade; and Option 4) reconstructing the trestle in such a way that it is functional and safe as a pedestrian bridge and compliant with current construction codes. Some form of interpretation should accompany Options 2, 3, and 4 in addition to the other work proposed. Any option that includes salvaging or restoring the remaining Bents, we have looked at as repairs being made according to the Secretary of the Interior's Standards for the treatment of historic properties.

### SHORT TERM PRESERVATION

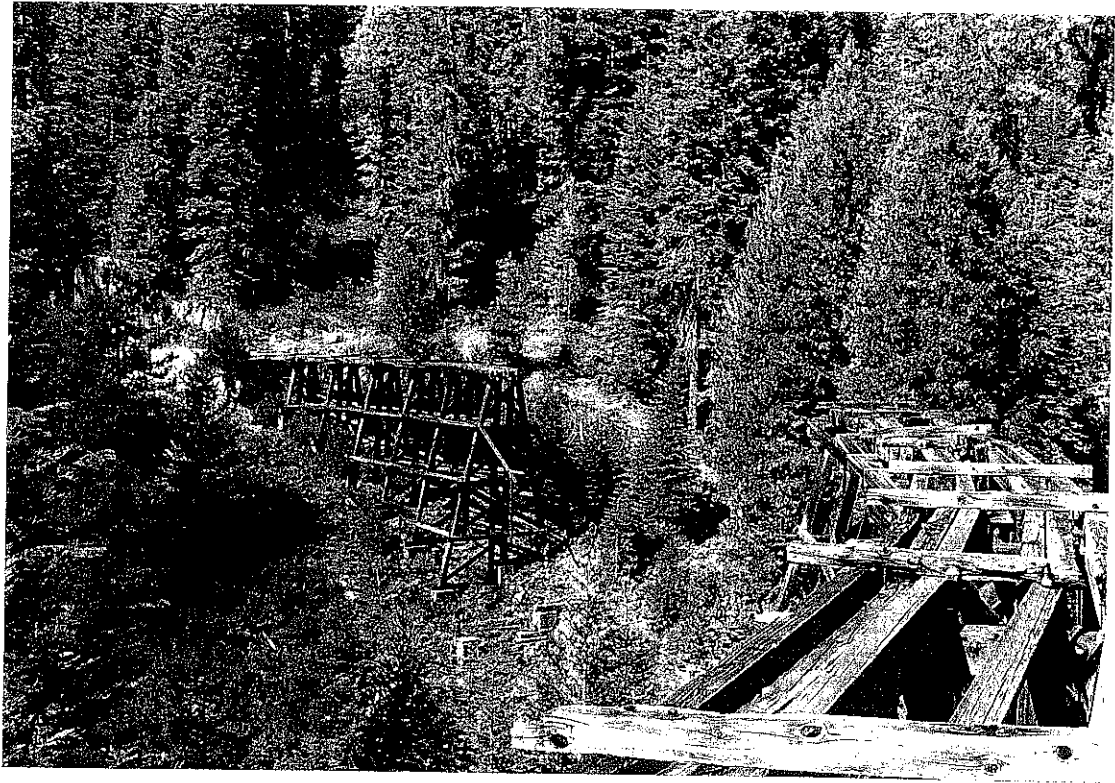
Short term preservation is a precarious situation. There are some temporary measures that could be installed that could extend the time before a decision on how to complete this project is determined. These temporary measures will not permanently fix the situation, they will only help to hold them for a limited time, and may not hold through an earthquake.

Bent #14 is the closest remaining bent to the stream bed. The top of this bent has already fallen, but the lower portion still remains. The foundation of this bent has been undermined and is very precarious in its position. This bent should be taken down before what is left falls down and maybe takes part of Bent #15 with it.

Earth that is up over the top of the foundations onto the sill plates should be lowered to approximately 4" - 6" below the bottom of the sill. Clean all soil and moss

from the wood. Diagonal braces could be installed along the outside of the trestle, both on the upstream and on the downstream side. These diagonal braces should be at least 2 x 6 in size with a minimum of 4 - 16d nails at each crossing. Do not place all of the diagonals in the same direction, they should form "x"s across the length of the remaining bents. The nails used should be double headed to facilitate easy removal when final repairs are to be made. At any of the bents where the horizontal or vertical members are crushing additional support should be provided to relieve some of the weight from these members. Each one of these cases will be slightly different and the solution for support will have to be designed for each one.





## OPTION 1: INTERPRETATION

The existing trestle should never be completely removed from the canyon. We feel as part of the interpretation the concrete footings and maybe some of the sill members should be left in place. The brush and surrounding vegetation should be kept clear of the footings so that visitors can experience them.

One method of interpretation might be to build a large vandal proof clear case to display a scale model of the trestle at one end of the original trestle location. The downside of this option is that the remoteness of this location will make it much more difficult to vandal proof a case. There are a number of clear plastics that are considered bullet proof and could be used to make the display box, this would be more expensive but it would have a better chance of staying intact. A concrete foundation and pedestal could be constructed to keep it in place and anchored to the ground. Another similar box could display the cast iron hardware and pieces of the original wood frame so people could see the size of the members that the structure was made of.

Another method would be to construct a kiosk for display of photographs, drawings, and other items to describe the original trestle. Also mounted here could be a diagram explaining what is still visible on the site.

A third method could be to remove all of the existing material as previously described. Reuse the existing materials to rebuild the 2 or 3 of the tallest bents in the middle of the stream bed. By removing the remaining bents and salvaging the existing lumber and reusing the fallen timbers, we believe that 2 or 3 bents could be built entirely out of existing materials. This would be a dramatic display of how tall the original trestle would have been as someone is standing next to it at the bottom looking up. It will also be visible from the top of the trail at each end, because of the curve of the original track layout. The best candidates to rebuild would Bents #10 - 13. The foundation at Bent 10 is almost completely intact. Some additional concrete would be needed on the upstream footing. Bent #11's foundation is not in good shape, the upstream and downstream footing would have to be replaced. Bent #12 is in good shape although the downstream footing would require repair or replacement. The foundations for Bent #13 are in good condition. This method would require a new trail to be built on both sides of the stream bed canyon, as well as a path across the stream itself.

A fourth method would be to produce a self guided walking tour brochure with interpretive signage along the trail. This is probably the least expensive method, although having everything in a pamphlet is not the same experience as being able to see and or touch the full sized materials.

CONSTRUCTION ESTIMATE  
 WORK UP SHEET

MaCabe & Pressey

DATE: 29-Dec-99  
 BY: D.HINRICHS

ITEM	DESCRIPTION	QUANTITY	UNIT	U.C.	TOTAL
1.0					
2.0					
3.0	ASSUMPTION:				
4.0	REMOVAL OF ENTIRE TRESTLE WITH EXCEPTION OF FOOTINGS AND SOME SILL MEMBERS				
5.0					
6.0	DEMOLITION:				
7.0	REMOVE HEAVY TIMBERS	100,000	BF	\$3.00	\$300,000
8.0	REMOVE HARDWARE AND METALS	1	LS	\$9,000.00	\$9,000
9.0	SUBTOTAL			SEE NOTE	\$309,000
10.0					
11.0					
12.0	METHOD #1 - VANDAL PROOF DISPLAY CASE				
13.0	MODEL AND MODEL DISPLAY CASE	1	EA	\$24,750.00	\$24,750
14.0	BRIDGE SAMPLE CASE	1	EA	\$9,750.00	\$9,750
15.0	CONCRETE FOOTING & ANCHORS	2	EA	\$1,500.00	\$3,000
16.0	SUBTOTAL				\$37,500
17.0					
18.0					
19.0	METHOD #2 - KIOSK W/ PHOTOS & LITERATURE				
20.0	KIOSK STRUCTURE	1	LS	\$7,500.00	\$7,500
21.0	SUBTOTAL				\$7,500
22.0					
23.0					
24.0	METHOD #3 - REBUILD 3 TALL BENTS - USE EXISTING MATERIALS				
25.0	CONCRETE FOOTINGS	24	CY	\$1,500.00	\$36,000
26.0	HEAVY TIMBER FRAMING	45,000	BF	\$7.50	\$337,500
27.0	STRUCTURAL HARDWARE	1	LS	\$16,875.00	\$16,875
28.0	SEAL WOOD MEMBERS	1	LS	\$7,500.00	\$7,500
29.0	SUBTOTAL				\$361,875
30.0					
31.0					
32.0	METHOD #4 - GUIDED TOUR WITH SIGNAGE				
33.0	TRESTLE SITE SIGNAGE & BROCHURE ALLOWANCE	1	LS	\$8,750.00	\$8,750
34.0	SUBTOTAL				\$8,750
35.0					
36.0					
37.0					
38.0	NOTE:				
39.0	THESE TIMBERS WOULD HAVE CONSIDERABLE SALVAGE VALUE WHICH COULD POTENTIALLY OFFSET				
40.0	THE COST TO DEMOLISH AND REMOVE STRUCTURE.				
41.0					
42.0					
43.0					
44.0					
45.0					
46.0					
47.0					
48.0					
49.0					
50.0					
51.0					
52.0					
53.0					
54.0					
55.0					

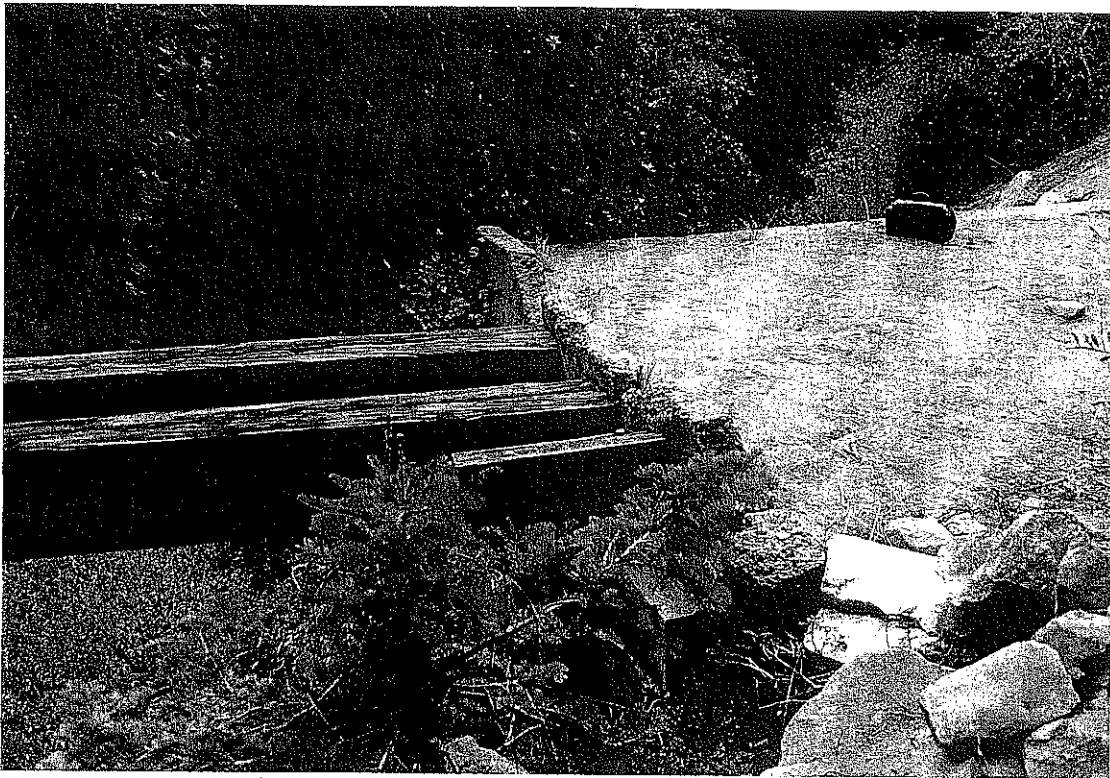


## OPTION 2: STABILIZE IN PLACE

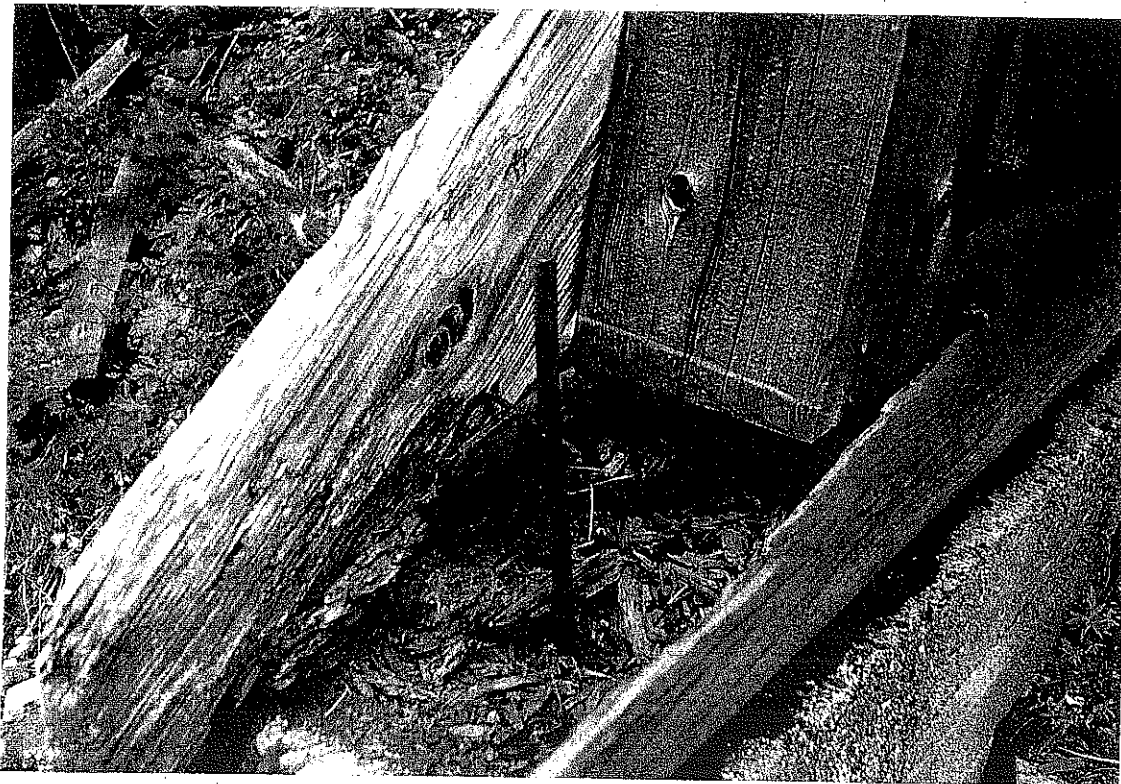
The Bourland Trestle as it stands today consists of bents #1-6 and #15-22, also still in place are the landings on each end. Bents #7-14 have completely or mostly fallen. Stabilization of the remaining bents would require preservation and structural work to be accomplished on all of the remaining bents.

The missing or deteriorated members of the remaining bents will need to be replaced or repaired. The debris that has fallen into a heap in the stream bed must be removed. Reuse any available material from the pile to replace missing or damaged materials. We suggest leaving the existing concrete footings in the stream bed so that people could still see the original path of the trestle. We also understand the need to restore the stream bed; therefore if necessary, the footings could be removed. Save all of the cast iron hardware and any bolts and spikes that can be found, for reuse or for displays. Do not replace any of the missing ties at the trestle top. New diagonal bracing may be required parallel to the track to give it more stability. This could be accomplished with long diagonal tie rods on both sides of the trestle. There are a couple of methods of preserving the existing wood members. A clear penetrating wood preservative could be applied to the total structure to stop dry rot from reoccurring. There is also an epoxy resin wood restoration product that could be used to repair the wood. We would recommend a combination of these two methods and materials.

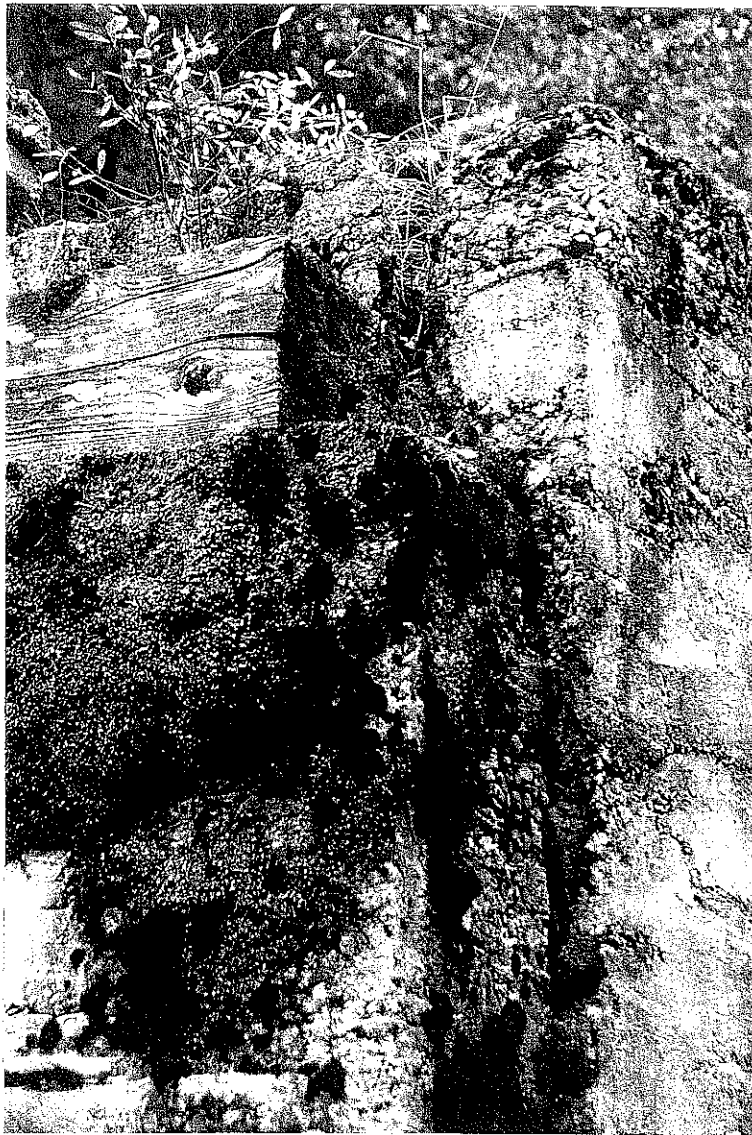
Since people would not be allowed onto this structure in this scenario the structural work would be to keep the remaining trestle bents in place only. The replacement of missing or badly deteriorated members and the restoration of the other members will take care of most of the structural requirements. The addition of diagonal tie rods should take care of the remaining structural inadequacies. Some modifications to the connections at various joints should also be done, this would include adding bolts or nails etc. A structural calculation will have to be run to determine how much resistance is required at each joint. Then the exact number of bolts or nails can be determined for each joint. The existing concrete footings at the bents that are to remain are in good condition, some minor work, such as some additional anchor bolts may be necessary. The ledger at the Landing #0 (this is the method of attachment to the concrete footing) will require some repair. It has been damaged and has some dry rot. There may be some work around the bottom of some of the footings to make sure they are securely tied to the ground. The Landing #23 has a larger vertical crack near the front corner that will have to be repaired.



Landing @ # 0



Sill dry rot with bolt coming through,  
not holding anything anymore



Landing @ # 23 shows vertical crack in concrete

CONSTRUCTION ESTIMATE  
WORK UP SHEET

DATE: 29-Dec-99

BY: D.HINRICHS

MaCabe & Pressey

ITEM	DESCRIPTION	QUANTITY	UNIT	U.C.	TOTAL
1.0					
2.0					
3.0	<b>DEMOLITION</b>				
4.0	REMOVE CREEK DEBRIS & DETERMINE SALVAGE VALUE	54,000	BF	\$3.00	\$162,000
5.0	REMOVE STREAMBED FOOTINGS	1	LS	\$11,250.00	\$11,250
6.0	<b>SUBTOTAL</b>				<b>\$173,250</b>
7.0					
8.0	<b>LANDING @ #0</b>				
9.0	REPAIR LEDGER	1	LS	\$750.00	\$750
10.0	<b>SUBTOTAL</b>				<b>\$750</b>
11.0					
12.0	<b>BENT #1</b>				
13.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
14.0	REPLACE 6" X 12" STRINGERS	240	BF	\$8.25	\$1,980
15.0	REPLACE 3" X 12" SWAY BRACE	44	BF	\$8.25	\$363
16.0	REPAIR DRY ROT / DAMAGE	7	LOC	\$525.00	\$3,675
17.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
18.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
19.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
20.0	<b>SUBTOTAL</b>				<b>\$12,108</b>
21.0					
22.0	<b>BENT #2</b>				
23.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
24.0	REPLACE 12" X 12" CAP	135	BF	\$8.25	\$1,114
25.0	REPLACE 6" X 12" STRINGERS	120	BF	\$8.25	\$990
26.0	REPLACE 3 1/2" X 7 1/2" LATERAL BRACES	88	BF	\$8.25	\$722
27.0	REPLACE 3" X 12" SWAY BRACE	192	BF	\$8.25	\$1,584
28.0	REPAIR DRY ROT / DAMAGE	5	LOC	\$525.00	\$2,625
29.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
30.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
31.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
32.0	<b>SUBTOTAL</b>				<b>\$13,125</b>
33.0					
34.0	<b>BENT #3</b>				
35.0	EXCAVATE EXCESS SOIL @ FOOTING	1	LS	\$450.00	\$450
36.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
37.0	REPLACE 6" X 12" STRINGERS	600	BF	\$8.25	\$4,950
38.0	REPLACE 12" X 12" BATTERED UPRIGHT	450	BF	\$8.25	\$3,713
39.0	REPAIR DRY ROT / DAMAGE	6	LOC	\$525.00	\$3,150
40.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
41.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
42.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
43.0	<b>SUBTOTAL</b>				<b>\$18,353</b>
44.0					
45.0	<b>BENT #4</b>				
46.0	EXCAVATE EXCESS SOIL @ FOOTING	1	LS	\$450.00	\$450
47.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
48.0	REPLACE 6" X 12" STRINGERS	240	BF	\$8.25	\$1,980
49.0	REPLACE 9 1/2" X 12" BENT BRACE	238	BF	\$8.25	\$1,964
50.0	REPLACE 3" X 12" SWAY BRACE	96	BF	\$8.25	\$792
51.0	REPLACE 3 1/2" X 7 1/2" LATERAL BRACES	88	BF	\$8.25	\$726
52.0	REPAIR DRY ROT / DAMAGE	5	LOC	\$525.00	\$2,625
53.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
54.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
55.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
56.0	<b>SUBTOTAL</b>				<b>\$14,627</b>

CONSTRUCTION ESTIMATE  
 WORK UP SHEET

DATE: 29-Dec-99  
 BY: D.HINRICH

MaCabe & Pressey

ITEM	DESCRIPTION	QUANTITY	UNIT	U.C.	TOTAL
57.0					
58.0	<b>BENT #5</b>				
59.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
60.0	REPLACE 6" X 12" STRINGERS	120	BF	\$8.25	\$990
61.0	REPLACE 9 1/2" X 12" BENT BRACE	238	BF	\$8.25	\$1,964
62.0	REPLACE 3" X 12" SWAY BRACE	96	BF	\$8.25	\$792
63.0	REPAIR DRY ROT / DAMAGE	3	LOC	\$525.00	\$1,575
64.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
65.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
66.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
67.0	<b>SUBTOTAL</b>				<b>\$11,411</b>
68.0					
69.0	<b>BENT #6</b>				
70.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
71.0	REPLACE 12" X 12" CAP	135	BF	\$8.25	\$1,114
72.0	REPLACE 6" X 12" STRINGERS	360	BF	\$8.25	\$2,970
73.0	REPLACE 9 1/2" X 12" BENT BRACE	201	BF	\$8.25	\$1,658
74.0	REPLACE 3" X 12" SWAY BRACE	96	BF	\$8.25	\$792
75.0	REPLACE 12" X 12" VERTICAL UPRIGHT	372	BF	\$8.25	\$3,069
76.0	REPLACE 3 1/2" X 7 1/2" LATERAL BRACES	219	BF	\$8.25	\$1,805
77.0	REPAIR DRY ROT / DAMAGE	3	LOC	\$525.00	\$1,575
78.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
79.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
80.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
81.0	<b>SUBTOTAL</b>				<b>\$19,073</b>
82.0					
83.0	<b>BENT #15</b>				
84.0	EXCAVATE EXCESS SOIL @ FOOTING	1	LS	\$450.00	\$450
85.0	REPLACE 9 1/2" X 12" BENT BRACE	108	BF	\$8.25	\$891
86.0	REPAIR DRY ROT / DAMAGE	4	LOC	\$525.00	\$2,100
87.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
88.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
89.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
90.0	<b>SUBTOTAL</b>				<b>\$6,291</b>
91.0					
92.0	<b>BENT #16</b>				
93.0	STABILIZE SOIL @ FOOTING	1	LS	\$1,125.00	\$1,125
94.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
95.0	REPLACE 9 1/2" X 12" BENT BRACE	54	BF	\$8.25	\$446
96.0	REPLACE 6" X 12" STRINGERS	360	BF	\$8.25	\$2,970
97.0	REPLACE 3 1/2" X 7 1/2" LATERAL BRACES	175	BF	\$8.25	\$1,444
98.0	REPAIR DRY ROT / DAMAGE	4	LOC	\$525.00	\$2,100
99.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
100.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
101.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
102.0	<b>SUBTOTAL</b>				<b>\$14,174</b>
103.0					
104.0	<b>BENT #17</b>				
105.0	STABILIZE SOIL @ FOOTING	1	LS	\$1,125.00	\$1,125
106.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
107.0	REPLACE 9 1/2" X 12" BENT BRACE	238	BF	\$8.25	\$1,964
108.0	REPLACE 6" X 12" STRINGERS	360	BF	\$8.25	\$2,970
109.0	REPLACE 3 1/2" X 7 1/2" LATERAL BRACES	44	BF	\$8.25	\$361
110.0	REPLACE 3" X 12" SWAY BRACE	192	BF	\$8.25	\$1,584
111.0	REPLACE SILL	434	BF	\$8.25	\$3,581
112.0	REPAIR DRY ROT / DAMAGE	4	LOC	\$525.00	\$2,100

CONSTRUCTION ESTIMATE  
WORK UP SHEET

DATE: 29-Dec-99

BY: D.HINRICH

McCabe &amp; Pressey

ITEM	DESCRIPTION	QUANTITY	UNIT	U.C.	TOTAL
113.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
114.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
115.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
116.0	<b>SUBTOTAL</b>				<b>\$19,774</b>
117.0					
118.0	<b>BENT #18</b>				
119.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
120.0	REPLACE 6" X 12" STRINGERS	240	BF	\$8.25	\$1,980
121.0	REPLACE 3 1/2" X 7 1/2" LATERAL BRACES	88	BF	\$8.25	\$726
122.0	REPLACE 3" X 12" SWAY BRACE	192	BF	\$8.25	\$1,584
123.0	REPAIR DRY ROT / DAMAGE	5	LOC	\$525.00	\$2,625
124.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
125.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
126.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
127.0	<b>SUBTOTAL</b>				<b>\$13,005</b>
128.0					
129.0	<b>BENT #19</b>				
130.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
131.0	REPLACE 6" X 12" STRINGERS	360	BF	\$8.25	\$2,970
132.0	REPLACE 12" X 12" CAP	135	BF	\$8.25	\$1,114
133.0	REPLACE 3 1/2" X 7 1/2" LATERAL BRACES	88	BF	\$8.25	\$726
134.0	REPAIR DRY ROT / DAMAGE	5	LOC	\$525.00	\$2,625
135.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
136.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
137.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
138.0	<b>SUBTOTAL</b>				<b>\$13,525</b>
139.0					
140.0	<b>BENT #20</b>				
141.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
142.0	REPLACE 6" X 12" STRINGERS	120	BF	\$8.25	\$990
143.0	REPAIR DRY ROT / DAMAGE	8	LOC	\$525.00	\$4,200
144.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
145.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
146.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
147.0	<b>SUBTOTAL</b>				<b>\$11,280</b>
148.0					
149.0	<b>BENT #21</b>				
150.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
151.0	REPLACE 6" X 12" STRINGERS	120	BF	\$8.25	\$990
152.0	REPAIR DRY ROT / DAMAGE	9	LOC	\$525.00	\$4,725
153.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
154.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
155.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
156.0	<b>SUBTOTAL</b>				<b>\$11,805</b>
157.0					
158.0	<b>BENT #22</b>				
159.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
160.0	REPLACE 6" X 12" STRINGERS	360	BF	\$8.25	\$2,970
161.0	REPLACE SILL	120	BF	\$8.25	\$990
162.0	REPAIR DRY ROT / DAMAGE	5	LOC	\$525.00	\$2,625
163.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
164.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
165.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
166.0	<b>SUBTOTAL</b>				<b>\$12,675</b>
167.0					
168.0	<b>LANDING @ #23</b>				



CONSTRUCTION ESTIMATE  
WORK UP SHEET

MaCabe & Pressey

DATE: 29-Dec-99  
BY: D.HINRICHS

ITEM	DESCRIPTION	QUANTITY	UNIT	U.C.	TOTAL
169.0	REMOVE & REINSTALL (E) TIES	816	BF	\$3.97	\$3,240
170.0	REPLACE 6" X 12" STRINGERS	240	BF	\$8.25	\$1,980
171.0	REPLACE CAP	135	BF	\$8.25	\$1,114
172.0	REPAIR DRY ROT / DAMAGE	4	LOC	\$525.00	\$2,100
173.0	GROUT CONCRETE WALL	1	LS	\$262.50	\$263
174.0	REPAIR / REPLACE STRUCTURAL HARDWARE	1	LS	\$225.00	\$225
175.0	ADDITIONAL LATERAL BRACING ALLOWANCE	1	LS	\$1,125.00	\$1,125
176.0	SEAL WOOD MEMBERS	1	LS	\$1,500.00	\$1,500
177.0	SUBTOTAL				\$11,546
178.0					
179.0					
180.0	TOTAL CONSTRUCTION COST				\$376,770
181.0					
182.0					
183.0					
184.0					
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186.0					
187.0					
188.0					
189.0					
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### OPTION 3: NEW PEDESTRIAN BRIDGE

Our recommendation would be to build a new bridge on the upstream side of the existing trestle following the approximate curve of the trestle. We believe that it should be approximately 6' to 10' below the maximum height of the existing trestle. Being behind and below the existing trestle will help to hide the new bridge from the view of the historic trestle. The users of the bridge will still get to experience the height above the stream bed of the original trestle. The level from one end to the other will also stay fairly true to the original railroad grade, this should keep the accessibility issues to a minimum.

This bridge would be constructed of field fabricated steel trusses in small 8'-12' sections. This will make getting the necessary materials and equipment to the site easier. The foundation should be concrete for ease of maintenance. We should be able to keep new footings out of the stream bed to minimize possible damage. The steel structure if designed correctly should extend above the new walking deck to provide guardrails and handrails for the bridge. The steel should all be coated with a rust prohibitive coating. This coating will help to keep the maintenance costs down. The walking deck should be pressure treated wood planks. The surface of the planks will work as a non-skid surface as required for ADA compliance. Pressure treated thick plank lumber will last for a long time. Attachment of the planks to the steel structure is also a relatively easy construction detail. Small air gaps can be left around each plank so that air may circulate and dry out the planks to keep them from any possible dry rot situation.

If Option 3 is the direction desired then some of the other options must also be implemented. Option 2: Stabilize in place, should be accomplished so that the remaining portions of the trestle will stay in place. The existing trestle should remain in place to be experienced from the new bridge. Method 3 from Option 1 would also be a way to experience the original trestle. The rebuilding of 2 or 3 bents in the stream bed would be a dramatic view from the new bridge. Option 1: Removal of the trestle may also be desired if a new bridge is installed. The existing trestle could be left alone and allowed to deteriorate over time with the new bridge overlooking the decay. The problem with this is that the decaying trestle could fall onto the new bridge and destroy it. The liability problem of the decaying structure may be more than what you may want to take on.

CONSTRUCTION ESTIMATE  
WORK UP SHEET

DATE: 29-Dec-99

BY: D.HINRICH

MacCabe &amp; Pressey

ITEM	DESCRIPTION	QUANTITY	UNIT	U.C.	TOTAL
1.0					
2.0					
3.0	<b>SITE PREPARATION:</b>				
4.0	SITE GRADING @ LANDINGS	2	LOC	\$15,000.00	\$30,000
5.0	BACKFILL @ RETAINING WALLS	2	LOC	\$11,250.00	\$22,500
6.0	<b>SUBTOTAL</b>				<b>\$52,500</b>
7.0					
8.0	<b>SITE DEVELOPMENT:</b>				
9.0	SIGNAGE	1	LS	\$7,500.00	\$7,500
10.0	OBSERVATION & INFORMATION AREA	1	LS	\$22,500.00	\$22,500
11.0	<b>SUBTOTAL</b>				<b>\$30,000</b>
12.0					
13.0	<b>CONCRETE:</b>				
14.0	CONCRETE RETAINING WALLS	2	EA	\$37,500.00	\$75,000
15.0	CONCRETE PIER FOOTINGS	30	CY	\$1,500.00	\$45,000
16.0	<b>SUBTOTAL</b>				<b>\$120,000</b>
17.0					
18.0	<b>METALS:</b>				
19.0	STRUCTURAL WEB JOIST MEMBERS	123,200	LBS	\$2.63	\$323,400
20.0	MISC. PLATES, SHAPES & BRACING	18,480	LBS	\$3.38	\$62,370
21.0	METAL GUARD RAIL @ WALK DECK	640	LF	\$97.50	\$62,400
22.0	<b>SUBTOTAL</b>				<b>\$448,170</b>
23.0					
24.0	<b>CARPENTRY:</b>				
25.0	3" X 12" PRESSURE TREATED DECKING	9,600	BF	\$8.25	\$79,200
26.0	<b>SUBTOTAL</b>				<b>\$79,200</b>
27.0					
28.0	<b>TOTAL CONSTRUCTION</b>				<b>\$729,870</b>
29.0					
30.0					
31.0	<b>NOTE:</b>				
32.0	COST DOES NOT INCLUDE REWORK OF EXISTING TRESTLE. IF THIS OPTION IS CHOSEN, IT MUST BE ADDED TO				
33.0	THE PREFERRED OPTION AT THE EXISTING TRESTLE.				
34.0					
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#### OPTION 4: RECONSTRUCTION

Reconstruction of the trestle would be very similar to option 2 (stabilize in place) for the existing remaining bents. The difference would be in reconstructing bents #7-14, and the walking deck itself. The new bents #'s 7-14 should all be reconstructed to match the original historic appearance. As much of the original material that can be reused should be. We estimate that 25% of the debris pile could be reused. It may not be reusable in the original location or for the original use, but it could be reused as other members. We also estimate that 80% of the cast iron hardware is retrievable and reusable. The remaining members should be built using the exact size and type of material as was originally used. The foundations under bent #9, #11, and #14 as well as the downstream foundation of bent #12 will have to be replaced. A new foundation design should be considered to tie together the 3 individual foundations under each bent in the stream bed. The existing foundation for these bents consists of 3 separate concrete piers. The new foundation design should consider adding concrete between the separate footings to tie them together so they will act as one large continuous footing. This will stabilize the footings. This will give the structure and its foundations more strength to resist the forces of the flowing water and debris.

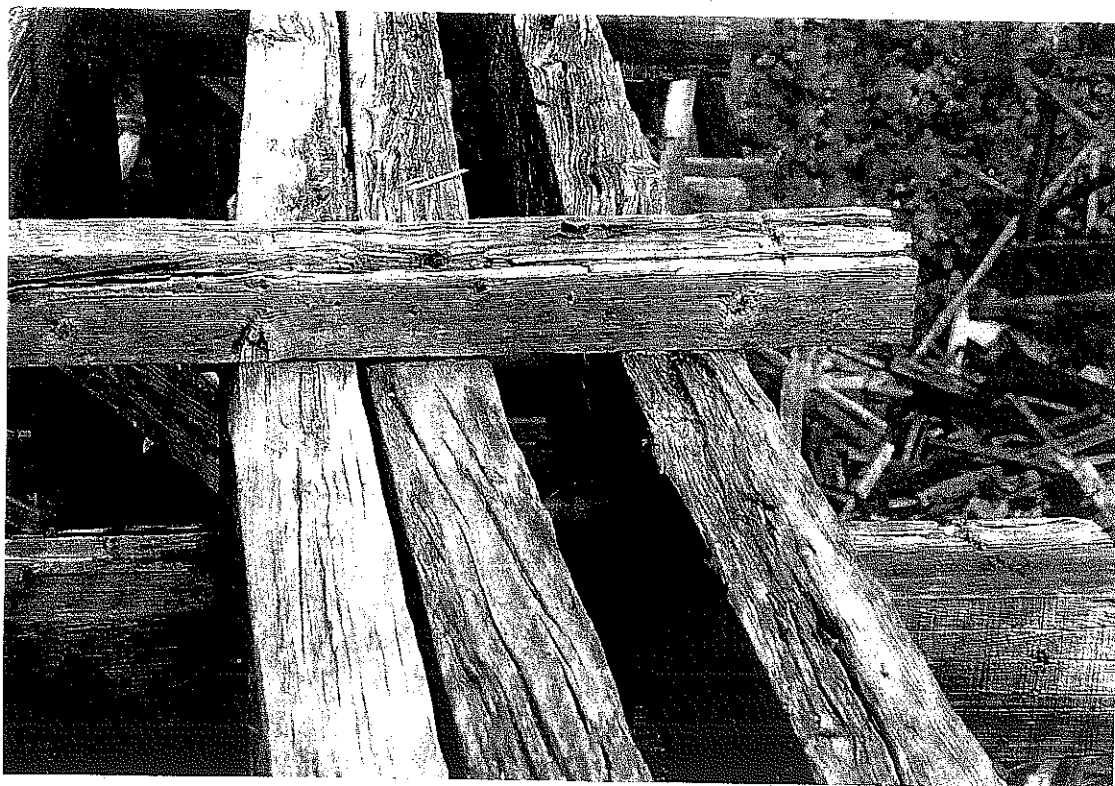
The original structure as designed and built had an inherent structural problem. There is no diagonal bracing in the direction of the track itself. In the redesign of this structure this will have to be taken care of. We believe that this can be done with a series of steel diagonal tie rods. If designed correctly they will look like a part of the original structure. Modifications to the existing joints between members of the trestle should also be considered such as additional bolts and spikes necessary to take the stresses in this area.

A new walking deck will have to be installed. Most of the original ties at the top of the structure have been removed. These ties should all be reinstalled. A new pressure treated thick plank walkway approximately 5 feet wide should be installed over the ties. A new guardrail and handrail should be designed to fit this structure without harming the historic fabric of the trestle. The guardrail could be steel posts bolted to the stringers with a continuous pipe top rail and 3/8" diameter cable horizontally between posts @ 4" O.C.. A 1½" diameter galvanized pipe handrail system can be set at the required height onto the same posts as needed for the guardrail.

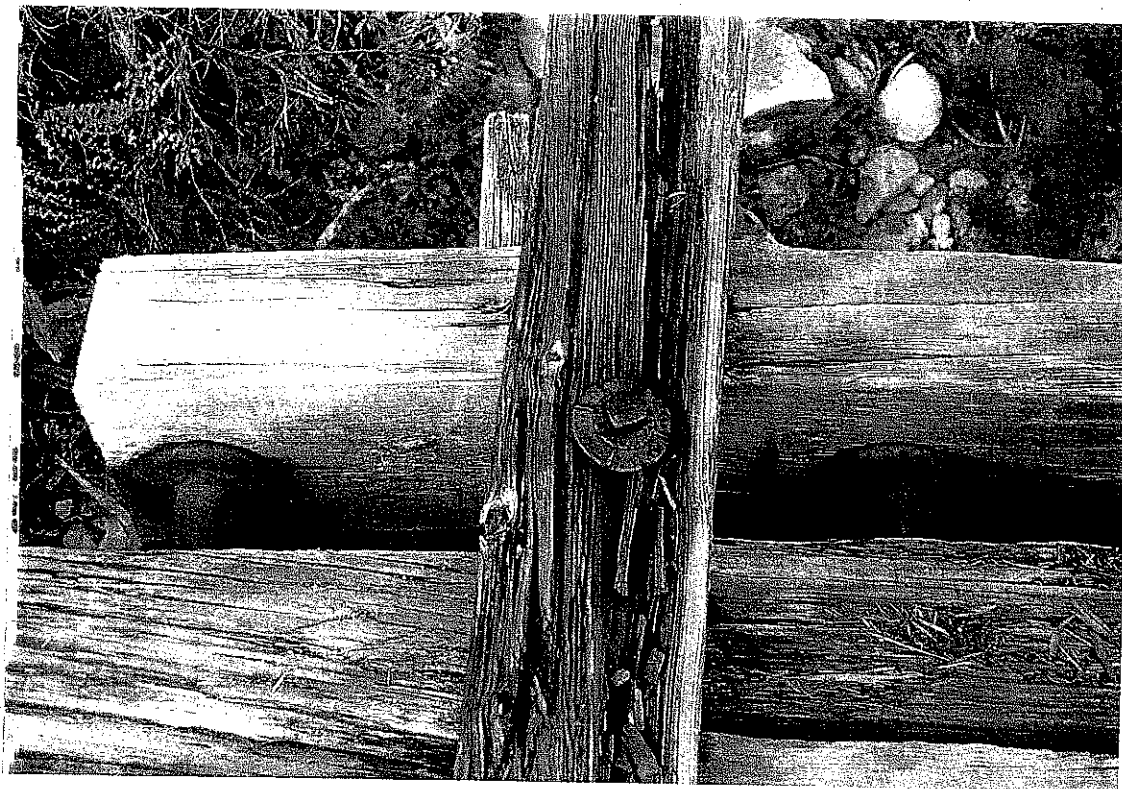
The entire structure should be coated with a clear penetrating wood preservative. This will make the job of maintenance a lot easier. The preservative will protect the wood from dry rot for the life of the product. At the end of the preservatives life span it will have to again be coated. The use of an epoxy resin wood restoration product will also help to protect the existing members. This resin will be used to repair existing members that have minor dry rot conditions that are repairable. The combination of these two products should protect the restored structure. The new guardrail/handrail system should be coated with a rust prohibitive product.



Dry rot shown on tops of stringers,  
heavy damage shown on stringer #1



Railroad tie showing some damage and cast iron  
hardware between the stringers



Dry rot, cast iron hardware, and bolted connection



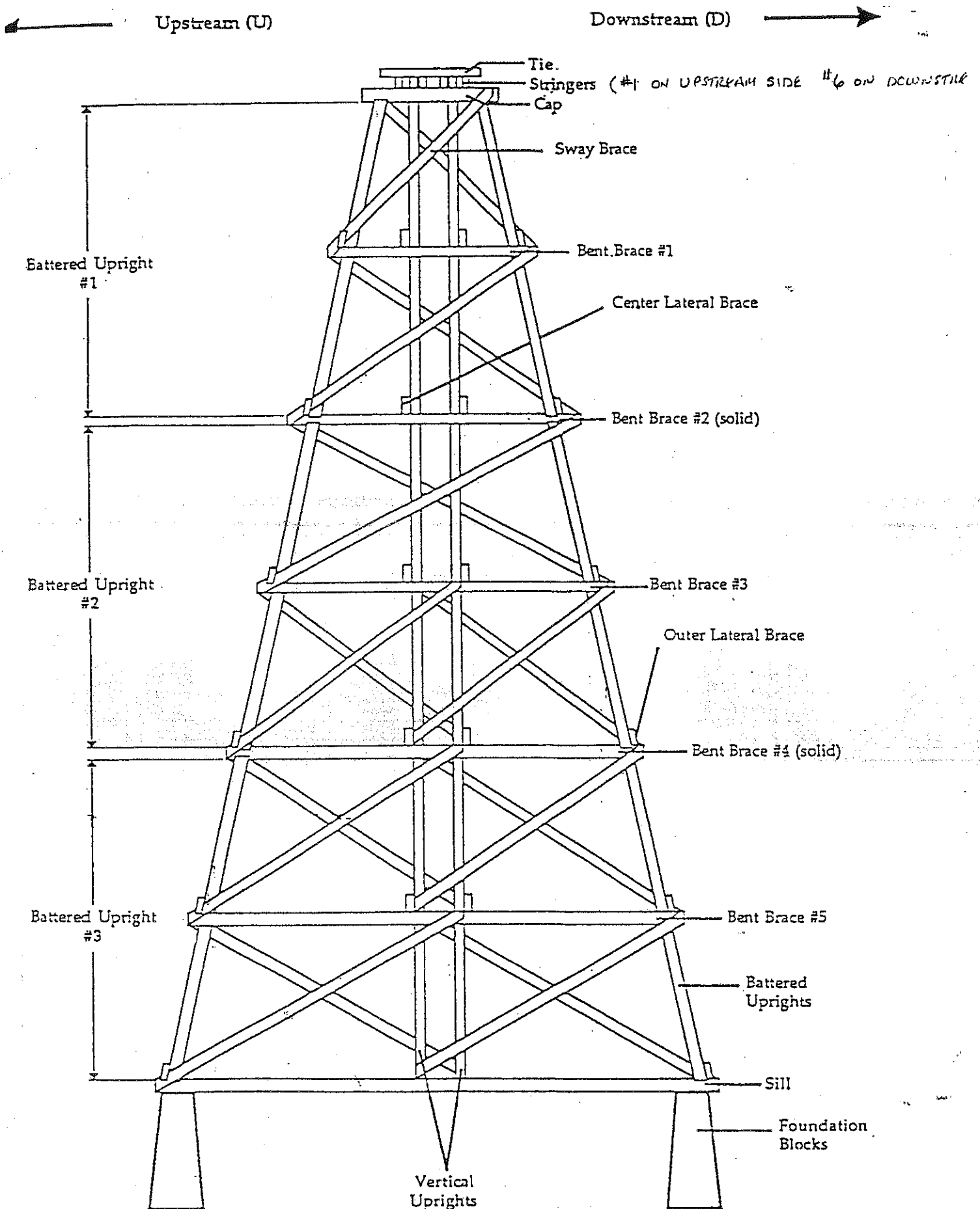
CONSTRUCTION ESTIMATE  
 WORK UP SHEET

DATE: 29-Dec-99  
 BY: D.HINRICHS

laCabe & Pressey

ITEM	DESCRIPTION	QUANTITY	UNIT	U.C.	TOTAL
1.0					
2.0					
3.0	STABILIZATION FROM OPTION #2				\$376,770
4.0					
5.0					
6.0					
7.0	BENT'S #7 - #14				
8.0	REMOVAL / REUSE OF CREEK BOTTOM DEBRIS	1	LS	\$100,000.00	\$100,000
9.0	8" X 8" TIES	6,171	BF	\$8.63	\$53,225
10.0	12" X 12" CAP	1,080	BF	\$8.63	\$9,315
11.0	6" X 12" STRINGERS	5,760	BF	\$8.63	\$49,680
12.0	BATTERED UPRIGHT	13,410	BF	\$8.63	\$115,661
13.0	12" X 12" VERTICAL UPRIGHT	11,088	BF	\$8.63	\$95,634
14.0	3" X 12" SWAY BRACING	6,684	BF	\$8.63	\$57,650
15.0	BENT BRACE	6,920	BF	\$8.63	\$59,685
16.0	LATERAL BRACE	6,650	BF	\$8.63	\$57,356
17.0	STRUCTURAL HARDWARE	1	LS	\$24,910.29	\$24,910
18.0	SEAL WOOD MEMBERS	1	LS	\$15,000.00	\$15,000
19.0	CONCRETE FOOTINGS	18	CY	\$1,500.00	\$27,000
20.0	SUBTOTAL				\$665,116
21.0					
22.0	METALS:				
23.0	METAL GUARD RAIL @ WALK DECK	700	LF	\$97.50	\$68,250
24.0	SUBTOTAL				\$68,250
25.0					
26.0					
27.0	TOTAL CONSTRUCTION COST				\$1,110,136
28.0					
29.0					
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33.0					
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# Bent Nomenclature

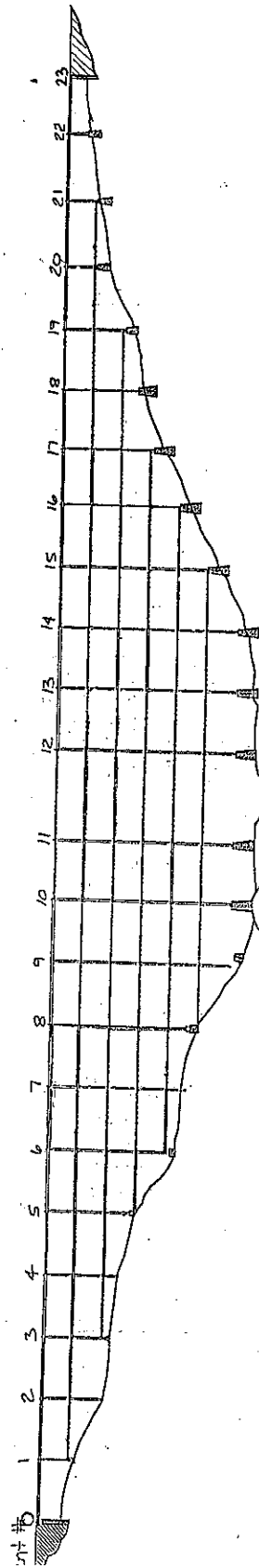


**BOURLAND TRESTLE  
LUMBER SIZES**

TIES	8" x 8" X 9' - 6"
STRINGERS	6" x 12"
CAP	12¼" x 11¾" x 11' - 3"
SWAY BRACES	2¾" x 12"
BENT BRACE (ODD #)	27/8" x 12¼" (each side of verticals)
BENT BRACE (EVEN#)	12" x 9½"
SILL	12" x 14"
BATTERED UPRIGHT (downstream)	11½" SQ.
BATTERED UPRIGHT (upstream)	13½" x 14"
VERTICAL UPRIGHT	11½" SQ.
LATERAL BRACE	3½" x 7½"



Complete Downstream View  
(LOOKING UPSTREAM)



## DESCRIPTION OF EXISTING REMAINING BENTS

### Landing @ # 0

Concrete is in good shape but the ledger needs some repairing.

### BENT #1

The foundation is in good condition. The sill plate on the downstream side has some dry rot in the end but is fixable. The nuts for some of the sill bolts are missing. The upstream battered upright has some damage but is fixable. One of the sway braces is deteriorated beyond useable. The cap is in need of some repairs. The #1 and #6 stringers are missing. Stringers #2-5 all have some damage but are fixable. (Stringers from Landing #0 to Bent #1).

### BENT #2

The foundation is in good condition. The sill has some dry rot but is fixable. Two of the lateral braces are bad and should be replaced. All of the sway bracing has dry rot to a point that would require them to be replaced. The cap is crushing and should be replaced. Stringers #3 and #6 are good, Stringers #1 and #5 are fixable, Stringer #2 has dry rot at the end over the cap on Bent #1 but should be fixable, and Stringer #4 is damaged badly and should be replaced. (Stringers and lateral braces from Bent #1 to Bent #2).

### BENT #3

The foundation is in good condition but the earth should be moved slightly, it is too high up on the concrete and is coming up onto the wood sill. The downstream battered upright is in bad shape, the upper level and lower level should be replaced, and the middle section looks like it is good enough to remain in place. The sway bracing has minor dry rot in various locations but all should be fixable. Bent brace #1 also has some dry rot in the downstream end, which is fixable. Stringer #5 has some damage but is fixable. Stringer #1-4 and #6 are all damaged too badly and should be replaced. (Stringers from Bent #2 to Bent #3).

### BENT #4

The foundation is in good condition, although it has the same problem as #3. The dirt is too high around the foundation and should be lowered. The upstream sill has some dry rot but is fixable. The #2 bent brace is crushed and needs to be replaced. There is dry rot in the connection at the upstream battered uprights and bent brace #2. Bent Brace #1 has dry rot in one end but it is fixable. Two of the sway braces are damaged and must be replaced. The 2 lateral braces above bent brace #2 on the downstream side need to be replaced. Stringer #1 is in good shape, #2 and #3 will need to be replaced. Stringers #4-6 have some minor damage but will be fixable. (Stringers from Bent #3 to Bent #4).

### BENT #5

The foundation is in good condition. The upstream sill has some dry rot but is repairable. Bent brace #2 has dry rot in one end and is beginning to be crushed in the center, it may still be salvageable. The battered upright on the downstream side between bent brace #1 and #2 has been spliced. This splice should be reevaluated. A couple of the sway braces also need to be replaced. Stringers #2 and #4 are in good condition. Stringers #1, #3 and #5 all have minor damage but are fixable. Stringer #6 is missing and will need to be replaced. (Stringers from Bent #4 to Bent #5).

### BENT #6

The foundation is in good condition. The downstream sill has previously been replaced. It was replaced with the wrong size member. It should be replaced if we are restoring it. Half of bent brace #3 is missing and should be replaced. Bent brace #1 is also bad on one side of it, and must be replaced. There is dry rot in the upstream vertical upright at the base of both members. The lower one may need to be replaced, the upper upright can be repaired. There are a number of lateral braces that are bad and must be replaced, one above bent brace #1 and one above bent brace #2, and three above bent brace #3. Two of the sway braces must also be replaced. The cap is missing and should be replaced. The #1 stringer is in good condition, #2 and #4 are missing and should be reinstalled, #6 will need to be replaced. Stringers #3 and #5 have some minor damage and are fixable. (Stringers and lateral braces from Bent #5 to Bent #6).

### BENTS #7-13 ARE GONE

### BENT #14

The upper half of the bent has fallen into the river, and the lower half is still in place. The foundation has been undermined and is about to come down as well. The remaining portion of Bent #14 should be removed before it falls on its own.

### BENT #15

The foundation is in good condition, although surrounding earth is beginning to fall away from it on the river side of the footings. There is some dry rot in both ends of the downstream sill but it is repairable. One of the vertical uprights has dry rot in two places, the base at bent brace #2 and at the sill. These areas are repairable. Bent brace #1 is gone and will have to be replaced.



#### BENT #16

The foundation is in fair condition, the center footing has soil washing out from under it on the downstream side. This area should be stabilized. The sill in the downstream side has some dry rot but it is fixable. The downstream vertical upright has termite damage at the bottom but it is repairable. There is also dry rot at the base connection of the upstream battered upright and the sill, it is minor and repairable. Half of bent brace #1 is bad and will need to be replaced. One of the lateral braces on each of the four levels is either broken or missing. The cap has minimal dry rot and is fixable. Stringers #1 and #2 are deteriorated badly and must be replaced. Stringers #3-6 are in good condition. (Stringers and lateral braces from Bent #15 to Bent #16).

#### BENT #17

The foundation is in fair condition. There is some washout of the soil occurring at the downstream side of the center footing. The downstream sill is dry rotted to the point of needing to be replaced. Bent brace #1 has some dry rot but is fixable. Bent brace #2 needs to be replaced. The upstream vertical upright is crushing at the top under bent brace #2 but is fixable. The downstream vertical upright and the battered upright between bent brace #1 and #2 have both been spliced and should be reevaluated. One of the lateral braces above bent brace #2 needs to be replaced. The sway bracing all has dry rot at the ends and should be replaced. The cap has minimal dry rot and can be fixed. Stringer #1 is dry rotted and must be replaced. Stringer #2 and #3 are missing and must be reinstalled. Stringers #4 and #5 are good. Stringer #6 has minor damage on the bottom and can be repaired. (Stringers and lateral braces from Bent #16 to Bent #17).

#### BENT #18

The foundation is in good condition. The sill members are also in good condition. There is some dry rot in the base of the downstream vertical upright that is fixable. The upstream battered upright is spliced and should be reevaluated. Two of the lateral braces must be replaced. All of the sway bracing has to be repaired. The cap has some dry rot but is fixable. Stringers #1 and #4 - #6 all have minor dry rot and are fixable. Stringers #2 and #3 are missing and should be reinstalled. (Stringers and lateral braces from Bent #17 to Bent #18).

#### BENT #19

The foundation is in good condition. The upstream sill has some dry rot at the connection with the battered upright, it is fixable. Both sills have large cracks along the grain that should be filled. Bent brace #1 will require repairs to both sides. The sway braces are deteriorated at the ends and should be repaired. All of the lateral braces above bent brace #1 will need to be replaced. The cap member is crushed from dry rot and will have to be replaced. Stringer #1 is in good condition, #2 and #5 are both repairable, #4 is damaged beyond repair and must be replaced, #3 and #6 are both missing and should be reinstalled. (Stringers and lateral braces from Bent #18 to Bent #19).

#### BENT #20

The foundation is in good condition, although there are no sill bolts visible on the upstream sill, and the downstream bolts do not have nuts on them. The sway bracing has some dry rot but is repairable. The cap has minimal dry rot and some cracking which are all repairable. Stringer #3 is in good condition. Stringer #1, #2, #4, and #6 are all fixable. Stringer #5 is missing and should be reinstalled. (Stringers from Bent #19 to Bent #20).

#### BENT #21

The foundation is in good condition, although the nuts are missing on the sill bolts on the upstream side. The sill in the downstream side has minimal dry rot and is fixable. The sway bracing has some minor splitting and dry rot on the ends and is all repairable. The cap has minor dry rot and is fixable. Stringer #4 is in good condition. Stringer #2, #3, #5, and #6 are all fixable. Stringer #1 is to be reinstalled. (Stringers from Bent #20 to Bent #21).

#### BENT #22

The foundation is in good condition. The downstream sill is crushed with dry rot and must be replaced. The sway braces are partially dry rotted but are repairable. There is minimal dry rot in the cap, it is repairable. Stringers #1, #2 and #5 are gone and should be reinstalled. Stringer #6 has minor damage and is fixable. Stringers #3 and #4 are in good condition. (Stringers from Bent #21 to Bent #22).

#### LANDING AT #23

The cap is dry rotted and crushing and must be replaced. The #4 and #6 Stringers are gone and must be reinstalled. Stringers #1, #2, #3 and #5 are all fixable. The concrete landing wall has a vertical crack at the connection on the downstream side of the two perpendicular concrete walls. It should be reevaluated. (Stringers from Bent #22 to the landing at #23).

